

REMARKS

Claims 1-16 are rejected under 35 U.S.C. §103(a) as being unpatentable over Kimura et al., U.S. Patent No. 5,724,057, in view of Silverbrook, U.S. Patent No. 5,793,345. Applicants traverse this rejection because the references do not disclose or suggest a voltage offset to a positive or negative constant level, as recited in claims 1, 3, 7, 8, 9 and 12.

The present invention prevents decrease of contrast ratio caused by the incomplete memory effect (when data is maintained in a picture element), and in particular, is concerned with preventing light transmittance in the picture element when data pulses of zero amplitude for displaying "black" are applied to the element. The decrease of contrast ratio is prevented by the use of driving signals which are positively or negatively offset a predetermined value with respect to a reference voltage of the panel, as shown in Figs. 4D1-4D6, which show potentials appearing across each picture element. The amplitude of the offset value is selected depending on a desirable variation of contrast ratio of the display panel (page 14, lines 16-24). The ratio is calculated from the light transmittance factor of black presentation, where the amplitude of the data signal is equal to 0V, and the light transmittance factor at white presentation, where the amplitude of the data signal is equal to 7V. The offset voltage is a constant positive or negative level. Typically, the value of the offset voltage is selected in the range of 0V to 5V for a contrast ratio between 60:1 and 100:1.

In the present invention, the voltage applied to the common electrode 80 is offset a positive or negative constant level. A common electrode voltage control circuit 6 serves as the controlled offset voltage supplier, which supplies a controlled voltage to the common electrode 80 (page 10, lines 13-18). The voltage ΔV_{ofs} is the offset provided to the common electrode 80 for a stable "black" presentation at the screen element (page 11, line 19-23). As seen in FIG. 4C, the voltage ΔV_{ofs} is offset from the reference level in the panel 1 a positive constant value.

The offset of Kimura, however, is not a positive or negative constant value, but is a correction voltage V_o that changes or is 0V. Changes are based on the contrast so that the position of 0V is offset to the amplitude of the data voltage (Col. 8, lines 62-66). The voltage of the electrode 20 is varied so that the amplitude of the common voltage becomes larger as the contrast drops (the contrast signal voltage level becomes higher) (Col. 9, lines 55-58). In the alternative, the common terminal 26 connected to the electrode 20 can be grounded, in which case the potential of the electrode 20 is set to a definite ground level (Col. 5, lines 28-41). Thus, Kimura merely teaches that the voltage of the electrode 20 is 0V or variable according to the contrast. Kimura does not disclose or suggest a voltage offset to a positive or negative constant level, as recited in the amended claims.

The Silverbrook reference does not remedy the deficiencies of Kimura et al., but is merely cited for teaching an LCD characterized by spontaneous polarization. Withdrawal of this rejection is respectfully requested.

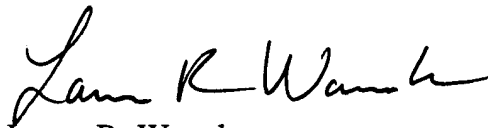
Applicant has added claim 17 and submits that no new matter has been added. Applicant further submits that claim 17 is allowable for the same reasons stated with respect to claims 1, 3, 7, 8, 9 and 12.

For the foregoing reasons, Applicants believe that this case is in condition for allowance, which is respectfully requested. The Examiner should call Applicants' attorney if an interview would expedite prosecution.

Respectfully submitted,

GREER, BURNS & CRAIN, LTD.

By



Laura R. Wanek

Registration No. 53,737

June 22, 2004

300 South Wacker Drive
Suite 2500
Chicago, Illinois 60606
Telephone: 312.360.0080
Facsimile: 312.360.9315
P:\DOCS\0671\65390\567900.DOC